



ALBANIA PRIVATE FORESTRY DEVELOPMENT PROGRAM

REPORT ON NUT PRODUCTION ASSESSMENT AND TRAINING

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Prepared by:
Dr. Loy W. Shreve
Retired Extension Horticultural Specialist

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ACRONYMS

APFDP	Albania Private Forestry Development Program
D.B.H.	Diameter Breast Height (42 feet above the ground line)
DFS	District Forest Service
FPRI	Forests and Pastures Research Institute
FTRI	Fruit Tree Research Institute
GTZ	German Agency for Technical Cooperation
Schnell Type Fence	Two adjoining electric fences 3 feet apart (one fence with two wires and one fence with one wire) designed to keep all animals, large and small, out of a specific area.

Report on Nut Assessment and Training

A. Overview and Objectives

The objectives of this assignment were to increase the ability of the owners of chestnut plantations in two villages in Pogradec to profitably manage their plantations on a sustained basis, and to develop a strategy for future APFDP support to nut production in general throughout Albania.

I greatly appreciate all the friendly and helpful APFDP staff and I am especially grateful and thankful for the guidance, translation and help given by Dr. Thimaq Lako, Private Forestry Specialist, APFDP. I am also very grateful and appreciate very much the translations and typing done for me by Klodian Deliallisi, Secretary and Communications Specialist, APFDP.

B. Overview of Activities

I interviewed government officials and private individuals with past experience in nut (chestnut, walnut and hazelnut) production and marketing. Officials interviewed with the help of Dr. Thimaq Lako, Forest Engineer and Private Forestry Specialist included: Dr. Haki Kola, Director of Albania Forestry Project (he had 15 prior years experience in nut production). He described a special walnut tree that he had discovered B the tree flushes late enough to always avoid spring frost. We also met with Dr. Kostandin Dano, nut specialist, and he described procedures for provenance testing. We also met with Dr. Liri Dinga, Director of Botanical Garden in Tirana.

On October 6, Dr. Lako and I went on a field trip to Berat, Fier and Vlora where we visited a *Juglans regia* plantation along with forest engineer Sokrat Kerri, Director of the DFS Berat, Edmond Lole, agronomist and nursery owner and a 5 acre hazelnut orchard, and Fatos Naka, forest engineer in the DFS Berat. On the night of October 6, we met with Osman Hoxha, agronomist and coordinator of Regional Extension Services who mentioned the weevil problem in hazelnuts. On October 7, we met with Dr. Hajri Ismaili, agronomist and coordinator of GTZ Horticulture project who showed us his methods for mass producing olive varieties by propagating cuttings of that species in a mist bed operated by an electronic leaf. From there we went to "Sota" forest and landscape nursery.

On October 8 we met with Ms. Sandra Stajka, Country Representative, Albania ACDI/VOCA. On October 11, we met with Dr. Maxhun Dida, Director of Forests and Pastures Research Institute who described the Institute's activities with pests and diseases and applied research, supported by the World Bank, and described the control work with chestnut blight as very successful. Also, on October 11 we met with Mr. Ismail Beka, Director of GTZ, in his office in Tirana where he described the German Cooperative System that they advocate for cooperatives in Albania. On October 12, we met with the Manager of Technical Development Unit of IFDC, Mr. Sabah Sena.

On October 13, Dr. Thimaq Lako and I traveled to Pogradec and with Mr. Vexhi Çinari, Forest Engineer, visited natural chestnut forest areas near the village of Stropska and interviewed a

chestnut producer in the village. We saw many chestnut trees infected with *Cryphonectria parasitica*, some had been infected with hypovirulent *C. parasitica* healed and are now apparently healthy. No controls have been done in the area examined.

On the morning of October 14, we interviewed Mr. Ylli Galo, Director of DFS Pogradec in his office. Then Dr. Lako, Dr. Lole and Mr. Çinari, Forest Engineer and specialist on chestnut blight control, looked over two walnut plantations near Stropska. We then visited a hazelnut orchard on a steep hillside where rows of trees were interplanted with a grape vineyard. We examined natural stands of chestnut forest overlooking Pogradec where the owners had performed mechanical control of chestnut blight.

On October 15, Dr. Lako and I visited Besnik Mançelli, Forest Engineer, private nursery owner and former director of the state forest nursery. I showed him (in his walnut nursery) how placement of walnut seed in the nursery row can affect the final performance of the seedling. We then visited the state forest nursery and observed a number of chestnut trees infected with blight. However, none of the trees in the valley where his own nursery was located had yet contracted the disease. On October 16 we visited a modern sawmill at Pogradec before returning to Tirana.

On October 18, Dr. Lako and I went to Qenam and visited Bajram Shera's nursery. This visit is described in subsequent pages.

On October 19, we met with Mr. Ilir Cico, agronomist and Head of the Research Unit in Fruit Tree Research Institute (FTRI) and Mrs. Rajmonda Nako, agronomist, FTRI, in Dr. Lako's office. They talked chiefly about wholesale robbery of timber (walnut and chestnut) from public forests. Ms. Nako talked about their experiences with hazelnuts. She said that one variety, Isoak, made up 85 percent of hazelnuts grown in Albania. She said that they had imported some very good varieties from Spain and established demonstrations, but these plots were destroyed during the transition in government. She and Mr. Cico advocate importing good varieties of hazelnuts from Spain for renewed demonstration plantings along with Isoak variety.

On October 21, we visited walnut and chestnut plantations at Shengjergj. This visit is described in the following pages.

On October 25, I assisted Dr. Lako in conducting training for nurserymen and growers at the Botanical Garden in Tirana. At this meeting and training session I reviewed my professional history for the participants, 8 nursery owners, one nut grower and one member of the state forest service. This included my work at Kansas State University as tree improvement forester and my work as Extension Horticulturist at Texas A&M University.

Questions directed to me were as follows: 1. My opinion on the chestnut blight control program in Albania; 2. Questions on vegetative propagation of walnut and chestnut, mostly about techniques in rooting of cuttings but some questions on the grafting of walnut varieties and special site rootstocks; and 3. Numerous questions on the culture of pecans and desirability of trying to grow pecans in Albania. My answer to No.1 was that it appears to be going well based on my limited view of the program. My answer to No. 2 was an explanation of the bulletins given to each of them (part on rooting) and I explained the use of special rootstocks for

adaptation to site (grafting and budding). In regards to No. 3, I recommended limited importation of seed and varieties for trial in Albania. However, I explained that the possible culture of Pecans in Albania looks promising.

On October 26, the nurserymen and growers presented their ideas of the types of training they needed and would like to have from APFDP foresters and their cooperating agencies.

C. The Chestnut Forest at Pogradec

The natural chestnut forests and plantations around Pogradec visited were coppices regenerated from the stumps of trees killed by chestnut blight *Cryphonectria parasitica* (Murr.) Barr. (Syn. *Endothia parasitica* (Murr.)). The trees of the owners that were examined have been treated by mechanical methods to control the blight by cutting the infected tree and then cutting infected shoots and limbs. The pruned wood was then burned.

The Forests and Pastures Research Institute recommends that the disease survey be carried out from April to July and that the pruning of shoots and branches should then be done to prevent the spread of *pycnida*. After each operation, tools should be disinfected with sodium hypochlorite solution or ethyl alcohol and the wound should be treated with $\text{CUSO}_4 + \text{Ca}(\text{OH})_2$ solution 3-5%. It is not known whether the disinfection of wounds and tools were performed but the results show that many young shoots appear free of cankers, many shoots have healed cankers (caused by hypovirulent *C. Parasitica*) and some shoots are infected with cankers.

This area contains as many as 20,000 shoots per hectare. Although many stems will be lost in this treatment method, many stems will presumably be saved that have resistance to blight. The forest is protected from grazing animals.

Vexhi Çinari, forest engineer and specialist on chestnut blight with Pogradeci DFS, has established plots in the Pogradeci forest where the aforementioned control method is combined with two methods of biological control: 1) the use of adversary microorganisms found in the soil under chestnut trees; and 2) hypovirulent *C. Parasitica* inoculations on infected and healthy trees. A third method is planned where blight-resistant chestnut varieties are grafted onto established trees.

The first method uses wet soil from under chestnut trees to cover blight infected cankers 1-5 cm thick. The mud is wrapped with plastic and tied to make sure that the mud covers the canker from the time of treatment throughout the growing season.

The second method is used in two ways: 1. Mycelium of hypovirulent strains of *C. Parasitica* are introduced into holes on the edge of the active cankers and covered with tape. This method is expensive and should be used on trees that are producing, have a well developed crown and produce quality nuts; 2. This method is used to boost the immunity of healthy trees that produce quality nuts. Application is the same as number one but with only one hole.

In both cases, equipment should be disinfected after each inoculation.

Albanian chestnut blight specialists have identified only two hypovirulent types of *Cryphonectria parasitica* in Albania and they use mycelium from these in their treatment of active cankers and immunization of healthy trees. Efforts to find other types in chestnut forest continue. When other types are found they will be included in treatment of chestnut trees. If sufficient numbers of active cankers are not healed by injection of present types, it should be worthwhile to import and try hypovirulent types of *C. Parasitica* from Italy, France, Switzerland, and other nearby countries.

The third method proposed, but not yet installed, will involve the grafting of hybrid varieties of *Castanea* that are resistant to the blight onto native *Castanea sativa* stocks growing in the plots. For example, the new blight resistant varieties developed in Spain and France as well as *Castanea mollisma*, Chinese chestnut and *Castanea crenata*, Japanese chestnut.

It would be interesting to see if immunity to the blight in epicormic shoots grown from healed hypovirulent *C. Parasitica* cankers or from the vicinity of these healed cankers could be transferred to stock plants by dormant scion grafts, greenwood scion grafts or even if such immunity would remain if the described epicormic shoots were rooted and planted in the area. Diagrams of dormant scion grafting methods and a diagram of a greenwood grafting method that is used in Texas are included in this report. Also, a method of rooting chestnut cuttings, that has been successful with *Castanea mollisma*, Chinese chestnut, and *Castanea dentata*, American chestnut, is described in the enclosed paper: "Propagating Texas Black Walnut, *Juglans microcarpa*, and Texas pistachio, *Pistachia texana*, from Cuttings in Milk Cartons."

Additional similar demonstration plots should be established in the Pogradec chestnut forest and in the other chestnut forests of this area by APFDP foresters and their cooperators. These plots should be established where they are readily accessible to the foresters, nut specialists, and growers. These plots could serve as a place to teach and demonstrate the best methods of chestnut culture to growers including disease control, variety selection, thinning, spacing, pruning, insect control, nut harvesting, development and harvesting of timber products and propagation (grafting, budding, rooting of cuttings).

If disease control goes as planned, there are several ways that the trees in the Pogradec forest could be spaced to obtain good production:

- Multiple stem clumps of disease resistant trees spaced (for example; 5 meters apart) to achieve the maximum in early nut production. Shoots can be removed or pruned as needed to assure sunlight reaching the entire canopy of the clump
- Thinning shoots from the clump to allow some light penetration causing lateral branch development on remaining shoots
- Develop by judicious pruning and thinning the tree to one or two shoots having lateral branches that provides a large nut bearing canopy that receives adequate sunshine all around. These trees should be low, spreading and easy to harvest but would require extensive pruning and intensive thinning as time goes on. The best timber products would be posts or firewood.

Another system would as its purpose the development of the chestnut stand for both nuts and timber. In such a development, for example, in alternate rows a single well formed stem would eventually occupy the spot and the stem would be pruned and developed as a forest tree that would produce nuts and eventually timber. Such a tree would be gradually pruned to provide a limb free saw log length trunk that could be utilized for lumber when the tree is felled, and the multi-stemmed trees could be thinned as the canopy of the single-stem tree expands.

Data collected by the DFS in Pogradec shows that during the period of 1972-1989, the average production of chestnuts in the district at 200-210 ton from a total area of 1067 hectares with the lowest of 4.4 ton in 1988 and the highest in 1972 with 343 tons.

During the period when the forest enterprise managed the chestnut area, the sales market was Tirana, Berati, Permeti and Korça districts. Some of the chestnuts were exported to other countries of Europe. The highest production in 1972, 343 tons on a 1067 hectares or 0.32 tons per hectare, compares unfavorably with 1998 California *C. Sativa* orchard production of 3.7 tons per hectare. Of course, California orchards are fertilized and irrigated. This is not a fair comparison, because similar management of a chestnut orchard in Albania might produce as well or better than the ones in California.

The present system of marketing by individual owners appears to be satisfactory considering the amount of chestnuts produced. However, with intensive management and control of chestnut blight, the amount of nuts produced in the area should greatly increase. Marketing in this case, could be facilitated by the formation and development of a chestnut growers cooperative organized according to the examples of German cooperatives in practice in Germany and being advocated in Albania by Dr. Hajri Ismaili, agronomist and coordinator of GTZ Horticulture Project. Also, a growers' cooperative would have advantages over marketing above including group purchases of fertilizer and equipment at much lower cost than when purchased by an individual.

D. The Shengjergj Chestnut Forest

On October 21, 1999, I traveled with Dr. Thimaq Lako to Shengjergj where we met with a retired economist, Mr. Qamil Xara, (grandfather) who was totally familiar with the chestnut forest we examined (he regularly went hunting for wild pigs and other game in the forest), and he took us on a walking tour of the chestnut forest.

This chestnut forest hand-planted over a ten-year period beginning in 1969 cover approximately 70 hectares. Survival has been good on both good and marginal sites. All trees are producing nuts, and those we examined (from bags of nuts being gathered by the villagers throughout the area that we examined) were very high quality, although a small percentage of the nuts were harvested prematurely as they showed light streaks on the nut shell. Nuts were harvested by flailing the branches with poles, to knock the unopened burrs from the limbs and then the burrs were opened by trampling by the gatherers. Bags of nuts were transported in the steep hilly area by horses. Gatherers told us that they sold the nuts in Tirana and they received 40 Lek per kilogram.

Trees range in size from 8 inches diameter breast height (DBH or 4.5 feet above ground level) and 15 feet in height in marginal sites to 16 inches DBH and 30 feet tall on good sites. Evidence of chestnut blight is greater on the poor sites than on the good sites. In all areas there is evidence of *Cryphonectria parasitica* infections. Some trees that are healthy and vigorous but showing where hypovirulent *C. Parasitica* infections have occurred and healed completely, can be found in all areas, some trees can be found where repeated blight infections have occurred and healed on the same tree (intermediate hypovirulent *C. Parasitica* infections), and numerous current infections were observed on the poor growing sites although we did not observe any current infections on any of the trees growing on good sites.

The chestnut forest is currently a state forest without enforceable regulation of any activity within its borders. This has resulted in illegal cutting and removal of trees, unregulated grazing, and nut harvest by the public in ways not good for the trees (flailing of branches) and, in some cases, a lower quality of nut (premature harvest). The first steps have been taken to divide the entire chestnut forest into many private ownerships.

Unregulated private ownership could, in time, result in complete destruction of this man-made chestnut forest brought about by grazing, conversion of timber land to pasture land, (clear-cut and sale of timber products), premature and unscientific harvest of timber, nut harvest practice that damages the trees, premature harvest that lowers the value of nuts produced, lack of insect and disease control, and possible forest fires. On the other hand, private ownership of this forest by many different owners presents a unique opportunity for the owners to manage the chestnut groves for high quality nut production and valuable timber production when trees need to be thinned to maintain or increase nut production.

It is apparent that the most profitable agricultural return possible from the chestnut forest area is the production and sale of chestnuts. To a lesser extent, the sale of wood products in cutting operations to increase nut production would provide some return, and the sale of hunting leases on the forest could provide some return. The situation that is developing in the ownership of this forest provides an opportunity for APFDP to assist the new owners of the chestnut forest to learn how to manage their chestnut groves for the greatest agricultural return possible. This could be done with an extension-style education program by APFDP foresters assisted by foresters in the districts in which the forest is located. District horticultural specialists, extension specialists, agronomists and plant pathologists and entomologists that would start with a public meeting with the new owners by APFDP foresters where possible chestnut profitability compared with other possible uses is discussed; and the reasons for rather strict forest standards are explained (no grazing, pruning, thinning, and disease control). Also discuss possible cooperative systems that could be used to manage the owners chestnut stands, and the advantages to owners where common standards are followed and the obvious financial advantages of cooperative marketing both in country and in the export market. Subsequent meetings and programs developed as necessary could include other forest and agricultural agencies as well as experts in cooperative development from GTZ.

Timely action by APFDP could not only save the present chestnut forest but could lead to the expansion of privately-owned chestnut plantations throughout the region.

E. A Training Package for Chestnut Improvement Tailored to the Needs of Future Producers in Albania

A training package for chestnut improvement tailored to the needs of future producers in Albania could include the profitable management of native chestnut forest, the planting of new chestnut forest, and the installation and management of chestnut orchards. A knowledge of how to control chestnut blight *Cryphonectria parasitica*, is essential to any of these. The knowledge of how to control the chestnut blight should be provided by professional foresters and horticulturists through field training in demonstration plots where actual control can be taught and the results of treatments can be seen by growers. Such training should provide the producer with the knowledge and skill he needs to control blight in his chestnut trees.

Professional foresters should provide training in management of native chestnut forest to producers through regular schools or clinics in demonstration areas where training in disease control, thinning, pruning, nut production, harvest of timber products and protection from grazing animals can be given and the results of these activities are readily visible and should be easily learned by the growers.

Professional foresters and horticulturists should show producers in permanent demonstration plots on suitable sites how to plant and care for new orchards. This would involve initial planting of nuts, seedlings or grafted trees. The planting of nuts or seedlings may be followed by training in propagation (grafting and budding) to better varieties. Also, training should be given in pruning to develop a saw log that would have value when removed in a thinning operation to increase nut production and timber volume on remaining trees. The chestnut orchard also provides an opportunity to teach proper fertilization and irrigation that may increase nut production to where it is equal to or better than present chestnut production in California.

Foresters and horticulturists should work with chestnut growers to improve marketing and increase returns for chestnut products in Albania. The villager who gathers chestnuts on the Shengjergji forest transports the nuts to Tirana and receives 40 Lek per kilogram (about 30 cents per kilogram). California chestnuts sold wholesale in that State for \$6.60 per kilogram. Chestnut growers in Albania produce high quality chestnuts, and, in the same market, would probably sell for as much as the California nuts if marketed in California. In any case, it would seem that the formation of a marketing cooperative by growers in Albania would increase the returns from chestnut sales and possibly greatly increase returns if an export market were developed by growers through a marketing cooperative.

F. Walnut Trees in Albania

On October 6, Dr. Thimaq Lako and I, along with engineer Sokrat Kerri, Director of DFS Berat; Edmond Lole, agronomist and nursery owner; and Fatos Naka, forestry engineer, Berat DFS; visited a plantation of 5,000 walnut, *Juglans regia* trees planted as seedlings in the late 1960s. Trees were planted on a high altitude too dry site. Although the trees had survived well, growth was abnormally slow in most areas. The exception was in low depressed areas where trees had made remarkably good growth and were producing small but well filled nuts. Trees were totally unprotected from grazing animals. Trees range in size from 6" DBH and 15 feet high to 12"

DBH and 30 feet high in the low depressed areas that apparently received and retained more moisture. I believe that if they had been planted at lower altitudes in better soil, that growth and nut production would have been satisfactory. On October 13, we traveled to Pogradec and walnuts observed alongside the road in and near that town appear to be growing well. On October 14, along with Dr. Lako, forest engineer Thoma Lole and the forest engineer Vexhi Çinari we visited a walnut plantation (actually three separate plantations) in Alarupi village. Trees had been planted in the 1980s, and those planted in low areas that retained moisture have done well considering that they suffer from grazing that has removed most of the ground cover leaving the soil under the trees bare and trampled by the grazing animals. This would be an ideal place to utilize a cheap "Schnell" type fence to keep the animals out. On one planted hill side, leaves of the trees are chlorotic apparently from lack of iron on a high pH site. Trees have not been pruned to develop sawlogs but they are producing nuts which are harvested and utilized.

On October 15, we visited nursery owner Besnik Mançelli who is growing a small plot of *Juglans regia* seedlings in his nursery as well as chestnut seedlings, fruit trees, landscape trees, and ornamentals. I pointed out to him that the walnut seedlings in his nursery that are growing more rapidly are not necessarily better than shorter trees but may be the result of seeds being placed in such a position in the soil that the developing shoot may be twisted and increased growth may be a temporary attempt to overcome this problem. Such walnut seedlings never overcome this stress and in a few years fall behind seedlings where the seed is placed in the soil so that the developing shoot never suffers from a lack of polarity. Also advised him to erect a cheap "Schnell" type electric fence to protect a chestnut nursery from grazing livestock. This nursery near Korça is in the heart of the apple growing region. All trees including walnut trees in this region appear healthy and are making good growth. On October 18, Dr. Lako and I visited the Bajram Shera's nursery at Qenam where we saw a highly productive orchard of oranges, lemons, olives, almonds and a seedling walnut tree that was about 8" DBH, over 25 feet tall and producing good nuts. Nearby was a five year old pecan seedling (from the variety "Tejas"), about the same size of the walnut producing male and female flowers but no nuts. I explained to him that Pecan needs another variety for a cross pollination in order for nuts to set. This orchard and nursery is irrigated, and this explains the phenomenal growth and development of the nut and fruit trees growing in the orchard. However, one also must take into account Mr. Shera's skill in growing trees and his dedication to his orchard and nursery.

On October 21, Dr. Lako and I traveled to Shengjergj to see chestnut and walnut plantations. We saw walnut plantations on the mountainside along the highway on state forest land that are making good growth and development. After we had examined the chestnut forest, we took our guide, Mr. Qamil Xara, the retired economist (grandfather) to his house in Shengjergj and on the trip down the mountainside observed many walnut trees growing as singles and in plantations that are going to be removed from state ownership and divided among villagers.

G. The Shengjergj Walnut Forest

This walnut forest hand-planted with seedlings over a ten-year period beginning in 1969 cover a large area and the entire walnut forest is in the process of being transferred from state ownership to private ownership. The walnut plantations will be divided among many private owners.

Trees (as observed from the forest road) appear to have made good growth and development where they were planted on good sites. One small plantation had an area on which leaves of the trees were chlorotic because they were apparently planted on a soil with a high pH.

Unregulated private ownership of walnut plantations could result in destruction of trees by grazing, conversion of plantations to pasture land, premature and untimely harvest of timber, and the lack of knowledge about possible profits from sustained nut and timber harvest from the walnut trees. Private ownership could, however, result in increased regard for the walnut trees if the new owners were shown how walnut trees could produce more income than any other use of the land. This possibility creates an opportunity for APFDP foresters to assist new owners of walnut plantations by teaching them how to manage their walnut trees for the highest possible return from nuts and timber. This could be done with an extension type education program by APFDP foresters assisted by foresters in the district where the walnut plantations are located, district horticultural specialists, extension specialists, agronomists, and other agricultural specialists that would start with a public meeting with the new owners by APFDP foresters where walnut profitability is compared with other possible uses, and the value of each possible use of the walnut plantation both present and long-term is fully explained. Also, possible cooperative systems that could be used to manage the owner's walnut trees for greatest returns and lowest costs should be explained. This could involve silvicultural systems that would produce the best nut crops and the highest quality timber to be removed in thinning operations. The advantages of cooperative marketing of nuts and timber should be explained. Subsequent meetings and programs developed as needed should include other forest and agricultural agencies as well as experts in cooperative development from GTZ.

H. A Training Package for Walnut Nut and Timber Production in Albania

A training package for walnut nut and timber production in Albania should include the profitable management of native walnut forest, planted walnut forest and walnut orchards. Training in walnut silviculture should be taught by professional foresters and, in the case of a walnut orchard, the forester could be assisted by a professional horticulturist.

Professional foresters should provide walnut management training in permanent demonstration plots in natural stands, planted forest and walnut orchards. These plots should be readily accessible and visible to growers and foresters. Training in these plots should include protection from grazing animals, disease control, pruning for improved timber quality, thinning, nut production and timber harvest. Training in the demonstration plots can be given in regular clinics and field tours.

Professional foresters and horticulturists should show walnut growers in permanent demonstration plots on suitable sites how to plant and care for new forest plantations and how to plant and care for new orchards. In the case of new forest plantations, this would involve planting of nuts or seedlings. In the case of walnut orchards training could cover the planting of nuts, seedlings, grafted trees, and the propagation of improved varieties onto established stocks by budding or grafting. Also, training in irrigation systems may be desirable and practical in some orchards.

Foresters and horticulturists should work with walnut growers to improve marketing of nuts and timber. A growers' cooperative market of walnuts and walnut timber would undoubtedly greatly increase the prices that owners receive for both nuts and timber and it would mean that the nut collector and pinhooker timber buyer would have to pay the market price and could no longer ply their profitable trade with individual growers. Fair return would be the greatest initiative for good walnut silviculture.

The preparation, publication, and distribution of extension-type bulletins on management of walnut forest, walnut plantations, walnut orchards, and individual single trees with pictures, diagrams, and explanation of procedures recommended should be an important part of a walnut training program. These bulletins should be readily available through APFDP foresters, district forest offices, and district horticulture offices, and should be given by foresters or horticulturists to participants in walnut training sessions they are conducting. This includes regional and district meetings as well as training given on demonstration plots.

I. Importation of Improved Grafting Materials

Castanea mollissima, Chinese chestnut, is resistant to *Cryphonectria parasitica*, chestnut blight, and produces high quality nuts and for these reasons, clonal material (dormant scions) as well as seeds for rootstocks and provenance testing should be imported for trial in result demonstration plots by APFDP foresters and their cooperating foresters and horticulturists from other agencies. These imports should include scionwood and seeds from high quality Chinese chestnuts currently being grown in the Southeastern United States where the climate is similar to the warm climate area of Albania. Also, import clonal material and seeds from high quality Chinese chestnuts growing in the North-eastern United States (West Virginia, Connecticut, Virginia, Pennsylvania and Michigan) for trial in result demonstration plots in the colder regions of Albania.

New hybrid varieties of chestnut have been developed in France and Spain that are resistant to chestnut blight and it would be practical to import seed and scionwood of these varieties for trial in result demonstration chestnut plots in Albania.

Juglans regia, import walnut clonal material (dormant scions) of improved varieties developed at the Forest and Nut Research Center in Budapest Hungary, of improved varieties developed at the Walnut Research Center in Georgiu Romania, and of improved varieties developed in Bulgaria for trial in result demonstration walnut plots in the walnut producing areas of Albania. All of the aforementioned have developed walnuts of outstanding quality, and, if not already growing in Albania, should be a very good addition to the varieties being grown there.

The Chinese foresters and horticultural have developed many new varieties of *Juglans regia* that bear high quality nuts from both terminal and lateral buds which allows a very small tree to bear many more nuts than a large tree which bears only terminal growth nuts (by far the most common). Imports of these varieties for trial in demonstration plots could prove to be a great benefit to the walnut growers in Albania.

Also, the importation and trial of some California varieties could be beneficial to the walnut growers in Albania. Select varieties from those recommended by Dr. Gale McGranahan, Professor, Department of Horticulture, University of California, Davis, California.

Where late spring frosts are a problem select and propagate identified native forest varieties that vegetate late enough to escape the frosts, for example, the so called "crazy tree" in Albania that does not flush until June and produces nuts every year because it does not freeze. Also, import seeds and scions of apomictic late blooming *Juglans regia* varieties developed by professor Joseph Sobek, University of Prague, Czech Republic, for trial in Albania.

Where soil pH is high (above pH7), import *Juglans microcarpa* seeds from Texas to grow seedlings to use as rootstocks on which to graft desired varieties of *Juglans regia*. *J. microcarpa* grows well in alkaline soils and *J. regia* varieties grafted onto it produce high quality walnuts. *J. regia* walnuts on their own root systems, at best, barely exist on alkaline soils because of their inability to get iron and other micronutrients necessary for proper growth and development from alkaline soil, but *J. microcarpa* rootstocks supply all nutrients for *J. regia* varieties grafted onto them. *Juglans microcarpa* is native to the alkaline soils of West Texas. Such grafted combinations have been very successful in Texas and in China where hundred of acres of *J. regia* on *J. microcarpa* orchards are now growing on high pH soils where they could not be grown before.

J. Hazelnut

Oregon produces 99 percent of hazelnuts grown in the United States. However, there is one very good reason for not importing grafting material from Oregon or anywhere in the United States: Eastern filbert blight has been identified at two locations in Oregon. This disease is devastating to the European filbert. Import improved filbert scions from surrounding countries that do not have this disease. For example, Italy, Spain, Turkey or any of the Balkan countries.

Ms. Rajmonda Nako, assistant researcher (FTRI) said that one variety Isoak made up 85 percent of hazelnuts grown in Albania. She especially likes some of the varieties from Spain and would like to establish demonstration of some of these varieties in areas where production can be compared with Isoak and other varieties now being grown.

K. Pecan

There are many commercial varieties of pecans grown in the Southeastern part of the United States. Wherever pecans are grown, they require a deep well drained soil, adequate soil moisture, a warm growing season, and nitrogen fertilization for best growth and development.

Trial demonstration plantings of pecans in Albania would show if these species would produce well there. A good way to start trial plantings, would be by importing seeds of the Indian varieties developed at Brownwood Texas by Romberg for provenance plantings and rootstocks. Scions of these varieties could be imported from the same place as the seeds two years later when the seedlings are large enough to graft. A good source for pecan imports is the Department of Horticulture, Texas A&M University, College Station, Texas.

L. Almonds

I have seen only two almond trees in Albania and both produce nuts. These are growing in Bajram Shera's nursery and orchard at Qenam. They sometimes have trouble from the late spring frost. A grower at Berati told me that his trees produced nuts in eight of ten years with the two unproductive years due to late frosts. The tree that produced the biggest and best nuts at Shera's orchard is the "Texas" variety from California. For that reason, I would suggest importing varieties commonly grown in association with "Texas" in California. To be tried along with "Texas" in selected areas of Albania with the least late spring frost. Varieties commonly grown with "Texas" include: Carmel, Non parallel, Price, and Ne Plus Ultra. Also, during a visit to Hungary in 1980, I witnessed very productive almond orchards at the Fruit and Nut Research Center in Budapest. It may be well worth the time of Albanian foresters in APFDP to make inquiries of Hungarian horticulturists for information on some of their better almond varieties.

M. A Strategy for Future APFDP Involvement in the Nut Sector

At a meeting of nurserymen growers and APFDP foresters at the Botanical Garden in Tirana on October 26, 1999; the nurserymen and growers presented their ideas on the training in nut culture that they would like to receive. They would like to know how nut trees develop in various regions of Albania. They would like to organize some regional workshops in Albania and make needs assessments for that region, and they believe that extension programs should be prepared based on that needs assessment. Also, they want training of seedling producers and nut growers for nut development. They believe that APFDP foresters should collaborate with the District Forest Service, the Agricultural Departments and Local Government to know the real situation and needs of farmers. They want training in selection of the varieties of nuts. They would like to know the experience and traditions of nut growing in the different regions of Albania. They want to know the potential of nut production and timber volume (value). They want to learn the market value of nuts and timber.

They would like to have two or three regional seminars (Berati district, Pogradeci district and Dibra district) each workshop to present the results of that district, and the workshop should be an annual one where farmers would participate and express their views.

The extension program should train nursery owners for nut production, they should establish trials and demonstration plots for nut growing, and they should establish clone orchards. The extension program should transfer the technology for growing nuts to nurserymen and growers. The program should arrange the importation of nuts and clonal materials from the United States and other places. Training can be coordinated to needs assessment.

A strategy for future APFDP involvement in the nut sector should follow the same pattern as suggested for the chestnut forest at Pogradec and nearby villages as well as the patterns suggested for chestnut plantations and walnut plantations at Shengjergj as these recommendations fall in place with the wishes expressed by the nurserymen and growers at the Botanical Garden meeting. The base for APFDP involvement should be the establishment and development of result demonstration plots in natural chestnut forest, chestnut plantations, chestnut orchards, walnut natural forest, walnut plantations, walnut orchards, hazelnut orchards,

almond orchards, and trial pecan plantings where training classes can be held that describe the best management practices for the area involved and in time, demonstrates the success of these practices. The APFDP foresters along with cooperating foresters and other agencies should develop bulletins that describe management practices advocated for distribution to cooperators and available to the public through agricultural agencies. Training and bulletins should provide growers with the knowledge of how to get the most possible return from their nut trees on a sustained basis.